Please ensure that your abstract fits into one column on one page and complies with the *Instructions to Authors* available from the Abstract Submission web page.

Copper speciation in organic wastes : an X-ray Absorption Spectroscopy.study

M. TELLA[1], M.N. BRAVIN[1] AND E. DOELSCH*[1]

[1] CIRAD, UPR Recyclage et risque, F-34398 Montpellier, France (*correspondence: emmanuel.doelsch@cirad.fr)

The benefits of the use of organic wastes as fertilizers and soil amendments should be assessed together with potential environmental and toxicological impacts due to the presence of trace metallic elements. The knowledge of metallic trace elements speciation is essential to fully understand their behavior after spreading of organic wastes and to predict their bioavailability. The present work was aimed at studying speciation of copper in various organic wastes (sewage sludge and composts from municipal solid waste and animals manure), which exhibit moderate to high levels of copper (24 to 340 mg kg^{-1} dry matter) and are commonly used in several countries as fertilizer or soil amendment (Saint Denis-La Réunion-France, Mahajanga-Magacascar, Dakar-Senegal). Size fractionation was first performed to account for the complexity of wastes and X-ray absorption spectroscopy (XAS) will be combined with different analytical approaches to determine speciation.

Organic wastes exhibited a fairly large enrichment in Cu in smaller solid fractions (0.2-20 µm) in comparison with raw wastes (130 to 1900 $mg.kg^{-1}$ dry matter). X-ray Near-Edge Structure Spectroscopy (XANES) spectra were recorded on smaller solid fractions and analyzed by combination of principal component analysis, target transformation, and linear combination fitting (LCF). Analyses of pre-edge and inflexions in the absorption edge of spectra indicated that Cu is present in both Cu(I) and Cu(II) oxidation states. Others inflexions provided information on the 3D geometry and coordination of copper. Therefore, LCF results showed that all small fractions are well fitted by different amounts of Cu(I)-S and Cu(II)-O in both octahedral and axial elongated octahedral (~square planar) geometries (Table 1).

	Cu(I)-S	Cu(II)-O	
		octahedral	square planar
Sewage sludge	60%	40%	$\leq$10%
Composts	30%	40%	30%
FF-MSWC	$\leq$10%	40%	60%

Table 1. LCF results for small size fractions of wastes (FF-MSWC=fine fraction from municipal solid waste composts)

In conclusion, Cu possesses its own chemical status and environments for each type of organic wastes, which could lead to different mobility after spreading on land.